

Induced Technological Change Under Energy Taxes

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We study induced technological change (ITC) following energy taxes to assess its contribution to energy savings and carbon dioxide emissions reduction. We develop a partial one-sector model with capital and labor as production factors, and endogenous technological change through learning by doing and learning through research. It is shown that, (i) when there is one representative energy source and energy demand is inelastic to prices, induced technological change is insignificant in reducing energy use. In contrast, (ii) when we allow for two competing energy sources, induced technological change accelerates substitution between the energy sources substantially. Analytical results are illustrated with simulations based on empirical energy data. Emissions reductions resulting from a fixed carbon tax are increased by factor 3 when we include ITC, but only when carbon-poor energy sources are available, and only after a long time delay.

Abstract for the International Energy Workshop
jointly organized by the
Energy Modeling Forum (EMF), International Energy Agency (IEA) and IIASA.
24-26 June 2003 at IIASA Conference Center, Laxenburg, Austria